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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,922	10/09/2001	Michael N. Grimbergen	5762	1090

7590

10/17/2003

Applied Materials, Inc.
Patent Department
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Santa Clara, CA 95052

EXAMINER

MEYER, DAVID C

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/974,922

Applicant(s)

GRIMBERGEN, MICHAEL N.

Examiner

David C. Meyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on August 20, 2003 have been fully considered but they are not persuasive.

The Applicant traverses the rejection claims 1, 12, 23, and 26-35 under 35 U.S.C. 102(b) in view of Suzuki, stating that Suzuki does not disclose "*a cut-off switch adapted to cut off energy from the energy source after a predetermined pulse light integrated intensity level [is detected by the light detector]*" (claims 1-11), "*a trigger circuit adapted to cut off power from the power source to the pulse light after a predetermined integrated intensity of light is detected*" (claims 12-22), "*cutting off power to the light source when the stored desired light intensity value and the detected light intensity value are substantially the same*" (claims 23-30), or "*disconnecting the power to the light source when the integrated light intensity value and the predetermined light intensity value are substantially the same*" (claims 31-35). In the Office Action dated May 30, 2003, the Examiner pointed out the features in Suzuki, which were viewed to correspond to the above-listed features.

The Applicant contests the Examiner's assessment that "[m]ain control system 8 sends start and stop signals to a trigger circuit 9 for cutting off the pulse light source *in response* to the integrated intensity signals" (Applicant's emphasis). In addition, the Applicant argues that the Suzuki disclosure is directed to "exposure control", which the Applicant implies refers only to attenuation of light pulses and not to the termination of the light pulses.

Hence, the applicant's arguments hinge on two claims:

- that the main control system in Suzuki *does not* send start and stop signals to the trigger circuit *in response* to a detected integrated intensity signal
- that exposure control refers *only* to attenuation of light pulses and not also to the termination of the light pulses

In column 6, lines 45-50, Suzuki discloses: "The integrated [intensity] value is supplied to a main control system 8 for exposure control. The main control system 8 sends oscillation start and end signals to the trigger control unit 9, and instructions to the light amount control unit 13 for light amount control by the low-speed attenuator 11 or the high-speed attenuator 13." The Applicant cites this quotation, but separates the first and second sentences, and mistakenly attributes the two sentences to different parts of the specification (page 3 of the Response). When the sentences are considered together, it seems reasonable to infer both that the main control system sends start and end signals in response to the integrated intensity value and that exposure control involves termination of pulses in addition to pulse attenuation.

Elsewhere, Suzuki describes separate coarse and correcting exposures; the duration of both exposures depends on an integrated intensity level. Suzuki discloses algebraic relationships for determining "the *number* and energy of the correcting pulses" (column 11, lines 3-5, emphasis added). The result of the disclosed exposure control method is the "[exact] control [of] the integrated value of pulsed energy, or the total exposure to [a] wafer" (column 11, lines 51-53). It is in the determination and control of

the number of pulses, by the main control system and the trigger circuit, that Suzuki anticipates the features in question.

Regarding the Applicant's traversal of the rejections under 35 U.S.C. 103(a) in view of Suzuki and in view of Johnson, the Examiner maintains that Suzuki fully anticipates the invention as claimed in independent claims 1, 12, 23, and 35. Hence, the obviousness arguments made in the previous Office Action are not overcome.

All rejections are upheld and made final.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 12, 23, and 26-35 stand rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (US 4,970,546).

Regarding claims 1 and 12, Suzuki discloses an exposure control device used in a semiconductor manufacturing process. The device comprises a pulse light source 10 connected to an energy source (not shown, but inherent). A light detector 24 is positioned to receive light pulses from light source 10. A monitor circuit 26 connected to light detector 24 integrates the intensity of the light pulses and supplies the integrated value to a main control system 8 for signal processing. Main control system 8 sends start and stop signals to a trigger circuit 9 for cutting off the pulse light source in

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response to the integrated intensity signals. (See Fig. 1; column 4, lines 10-23; and column 6, lines 35-63.)

An additional photosensor (not shown) for obtaining an integrated intensity value may be placed at a support stage for supporting a semiconductor wafer W undergoing a photolithographic process (column 12, lines 33-43). The photolithographic process would necessarily take place inside a reactor chamber of a semiconductor manufacturing system. Hence, the additional photodetector receives light pulses inside a reactor chamber of a semiconductor manufacturing system.

Regarding claims 23 and 31, the device of Suzuki performs the steps of generating light pulses from a light source 10 into the process reactor (not shown, but inherent) of a semiconductor wafer processing system; detecting the light pulses in the process reactor with an illumination sensor located on a support stage of the process reactor; integrating the light intensity of the pulses; and cutting off the pulse light source in response to the integrated intensity signals. The comparison to a predetermined intensity value is inherent. Such a predetermined intensity value would be stored in memory 6, which main control system 8 accesses to control a trigger circuit 9 for cutting off the pulse light source.

Regarding claims 26-29, monitor circuit 26 integrates light intensity signals corresponding to light pulses detected by light detector 24.

In response to the integrated light intensity signal obtained by monitor circuit 26, main control system 8 sends oscillation start and end signals to trigger circuit 9, which in turn triggers the starting and stopping (cutting off) of pulse light source 11. Oscillation

signals have a predetermined duration. Hence, the light pulses would have a predetermined duration.

Regarding claim 30, trigger circuit 9 cuts off pulse light source 11 when main control circuit 8 determines the integrated light intensity signal has reached a predetermined level.

Regarding claim 32, the light pulses emitted by light source 11 can be viewed as a series of consecutive single light pulses having a predetermined duration.

Regarding claims 33-35, the device of Suzuki performs the functions of emitting a plurality of light pulses, which are detected as light intensity values and integrated into an integrated light intensity signal.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 5-11, 13, 16-22, and 32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki.

Regarding claims 2, 5, 13, and 16, an integrator is an inherent part of the monitor circuit 26, which performs integration of light pulses detected by detector 24. A threshold comparator would be inherent to the main control system 8, which controls light source cutoff according to the integrated light intensity. Suzuki does not disclose a capacitor energy source for pulsing light source 11. It is well known to use a capacitor

as an energy source in pulse light applications because pulses of desired intensity can be achieved simply by varying the charge on the capacitor. It would have been obvious to one of ordinary skill in the art at the time of invention to use a capacitor in the pulsing of light source 11 of Suzuki because it is a simple and versatile means of driving a pulse light.

Regarding claims 6-9 and 17-20, the examiner has argued that it would have been obvious to use a capacitor in the pulsing of light source 11. Suzuki discloses a trigger circuit 9 that is positioned between the pulse light source 11 and main control system 8, to which a threshold comparator would be inherent. The trigger circuit starts and stops light pulses based on oscillation signals from main control system 8. This constitutes a repeated turning on and off. An oscillation signal has a predetermined frequency. Hence, the light pulses would have a predetermined duration.

Regarding claims 10-11 and 21-22, light detector 24 produces electrical light intensity signals in response to light pulses. Monitor circuit 26 integrates these light intensity signals into an integrated light intensity signal. Trigger circuit 9 cuts off pulse light source 11 when main control circuit 8 determines the integrated light intensity signal has reached a predetermined level.

6. Claims 3-4, 14-15, and 24-25, stand rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Johnson (US 5,969,805). Suzuki does not disclose a wavelength selective filter element associated with detector 24. It is well known to use a wavelength selective filter element in order to detect light that is free from undesired wavelengths, as taught by Johnson. Johnson discloses an apparatus for detecting the

endpoint of a semiconductor manufacturing process. The apparatus comprises a photomultiplier light detector 142 having a filter element 140. It would have been obvious to one of ordinary skill in the art at the time of invention to modify Suzuki by incorporating a wavelength selective filter element in order to detect a beam free from undesired wavelengths.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Meyer whose telephone number is 703-305-7955. The examiner can normally be reached on M-F 8:30-5:30.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on 703-308-4852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0935.

DCM
October 6, 2003


DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800